XVII.—*Note on the Ancient and Recent Natural History of Victoria.* By Frederick M'Coy, Professor of Natural Science in the University of Melbourne, and Director of the National Museum of Victoria, &c.

To the Editors of the Annals of Natural History.

Gentlemen,

I drew up the following remarks as part of the preface to the local Catalogue of the collection of Victorian objects prepared for the International Exhibition to be held next year in London. As I believe, however, that some of the observations on the development of life in the geological periods may be interesting to geologists, as well as this first announcement of my identification of the various Canadian compound Graptolites in Victoria, and my recognition of *Zamites* and *Tæniopteris* in our coal-beds, confirmatory of my view of their Mesozoic age, published more than a dozen years ago, in your Journal, I beg of you to do me the favour to permit me to occupy a little space once more in your pages.

I have the honour to remain, Gentlemen,

Your most obedient humble servant,

Frederick M'Coy.

The most extraordinary character of the Recent Fauna of Australia is the appearance of isolation from the types inhabiting other parts of the world, produced by the great number of species belonging to genera not found in any other country, and by a large proportion of the species not only belonging to genera peculiar to the place, but by these generic groups being frequently separated from the genera of animals inhabiting similar latitudes, existing under similar circumstances, and performing the same vital functions elsewhere, by characters of such high ordinal importance as to indicate families, tribes, and even orders not found anywhere else, and sometimes even affording the only examples of strange departure from the general anatomical plan on which all other animals are formed. It is a point of the highest interest to ascertain by the aid of palæontology how far back in the earth's history this isolation dates from; and on this point I propose offering a few preliminary remarks, as the space allowed for the notice on the ancient and modern natural history of Victoria precludes the possibility of entering upon extended specific details.

Nearly all the great geological works draw attention to the fact that in the oolitic rocks of England bones and teeth are found, indicating the former existence there of marsupial animals of the same family as the common Bandicoot (*Perameles*) of

Australia generally, and of the *Myrmecobius* of South Australia particularly—such types of general structure of insectivorous Marsupialia existing nowhere now on the face of the earth except in Australia; and these fossil bones near Oxford are accompanied by myriads of marine shells of the genus *Trigonia*—a genus not now existing in any other than the Australian seas, where four species of it are not uncommon. Such facts are very commonly received as indicating a continuance to the present day in Australia of the fauna which disappeared in all the rest of the world with the close of the Mesozoic period; and this again carries with it the belief that Australia was the most ancient country in existence, having remained as dry land above the level of the sea for a period corresponding to that in which all the Mesozoic and Cainozoic formations of the rest of the world were being deposited. I am enabled to state that there is no sufficient foundation for this theory, from the great quantity of fossils which I have lately examined as Palæontologist to the Geological Survey of Victoria; and from evidence of this kind I can offer a sketch of the ancient successive changes of organic life in this country.

Palæozoic Period.

The Azoic rocks, I can now state, were succeeded in Victoria, exactly as in Wales, Sweden, North America, and other parts of the world in the northern hemisphere, by a series of rocks enclosing fossil remains of the well-known genera and even specific types of animal life characterizing those most ancient fossiliferous strata termed Lower Silurian by Sir R. Murchison, and Cambrian by Professor Sedgwick. In the slates, north of Melbourne, containing the auriferous quartz-veins of the gold-fields, I have recognized abundance of the double Graptolites for which I formerly proposed the genus *Diplograpsus*, so characteristic of strata of this age; and, what is curious, I have found of this genus no peculiar or new species, but, on the contrary, the identical forms so abundant in the northern hemisphere: thus the most abundant and widely distributed species in Victoria is the *Diplograpsus pristis*, perfectly identical with specimens occurring in the slates of Scotland, Wales, Ireland, Bohemia, Sweden, New York and Canada; the next most common is the *D. mucronatus* of Hall, so abundant in the Utica slates of New York, and which I also recognized in the slates in Ayrshire and Radnorshire; the *D. rectangularis* (M'Coy) is the next most common Victorian species, and perfectly undistinguishable from those I originally described from the slates of Dumfriesshire; the *D. ramosus* (Hall) described by the American palæontologist as from the "Utica slates," near Albany, but which I also detected in Scotland, is likewise represented by well-preserved specimens in the National

Museum from our strata, although a rarer species than the others. The forms called *D. folium* and *D. bicornis* in Europe also occur. Of the short leaf-shaped Graptolites allied to the *D. folium* of Hisinger and *D. ovatus* of Barrande from those ancient beds in Sweden and Bohemia, for which Professor Hall has recently founded the subgenus *Phyllograptus*, I can identify in the utmost profusion in several localities north of Melbourne his typical species *P. typus*, which he describes as so abundant in the similar slates of Canada, in the Decades of the Palæontology prepared by him to illustrate this portion of Sir W. Logan's 'Geological Survey of Canada;' and it occurs in Victoria in all the extremes of varied form which he describes it to assume in America; several of the specimens, I might add, prove clearly the fact of which he seemed to have some doubt when he first announced it, and which was generally rejected by European geologists—namely, the quadripartite arrangement of the cell-laminæ. Of the Twin Graptolites, for which I formerly proposed the genus *Didymograpsus* (also characteristic of strata below the Upper Silurian), we have in Victoria the *D. serratulus* (Hall) identical with that from the New York slates; the *D. caduceus* (Salter), identical with his Quebec examples, is very common; and the *D. furcatus* (Hall), identical with the New York "Utica slate" species, also occurs, though more rarely. Also we have that compound species, the *Graptolites gracilis* (Hall), exactly identical with the New York and Canada forms, and, more curious still, many of those extraordinary compound radiating forms, the *Graptolites Logani* (Hall), *G. quadribrachiatus*, and *G. octobrachiatus* (Hall), so recently discovered in abundance in Canada, and peculiar to that country, except for the present announcement of their occurring in Victoria, in the slates at Castlemaine. Of the simple, or doubtfully twin, Graptolites, I have also determined the *Graptolites Ludensis* (Murch.), *G. tenuis* (Portlock), *G. latus* (M'Coy), and *G. sagittarius* (Hisinger), occurring in various localities within a hundred miles north of Melbourne in abundance of well-preserved specimens identical in every respect with specimens of the same species occurring in the similar slates in Wales, Scotland, and Ireland. In Victoria, as in most of the European and American Graptolite localities, the slates containing abundance of these bodies frequently contain no organic remains of Mollusca; one of the exceptions to this rule occurs in the black Graptolite slate of Pen Cerrig, near Builth, in Radnorshire, where, with the Graptolites *D. mucronatus* and *D. pristis*, I discovered in 1851 an immense profusion of a small Brachiopod shell, which I published under the name of *Siphonotreta micula*. European geologists in general will, I have no doubt, be as much astonished as I was to recognize exactly the

same Graptolites, accompanied by the same little Brachiopod shell in the similar black slates of the "Deep Creek" section north of Melbourne. The characteristic genus *Hymenocaris* of these ancient beds in Wales also occurs here in a peculiar species, the *Hymenocaris Salteri* (M'Coy). In many other neighbouring localities I have recognized so many of the ordinary Bala and Snowdon fossils as to enable me to suggest the mapping of the Bala beds to the Geological Survey; and over them are clear representations of the Mayhill Sandstone: but, confining ourselves to the details now first made known of the contents of the Graptolite beds, we have the astonishing fact of the *specific identity of the marine fauna over the whole world* during the most ancient palæozoic period. This had already been recognized over an extended area in the northern hemisphere; but the extension with the present detail to the southern hemisphere cannot fail to give rise to the most interesting geological speculations. I now proceed to give the first distinct announcement, based on specific identifications, of the existence of the Upper Silurian formation in the southern hemisphere; and here, too, geologists will learn with interest the fact that at Broadhurst Creek, in Victoria, the rocks are filled exclusively with a profusion of specimens of the Wenlock Shale Trilobite, the *Phacops* (*Odontochile*) *longicaudatus*, so abundant at Cheney Longville in Shropshire and many Wenlock-Shale localities in Britain; and the cuttings in Johnston-street, in Melbourne, have afforded us the *Orthoceras bullatum*, so abundant a Ludlow-rock fossil in Wales. Here, again, we can point now for the first time to the marvellous fact of the specific identity of the inhabitants of the seas of the most widely distant points of the northern and southern hemispheres during this second great geological epoch of the zoological history of the earth.

2. *Upper Palæozoic Period.*

Professor Morris, Professor Dana, and myself have formerly pointed out a considerable but more general resemblance between the Upper Palæozoic rocks underlying the coal beds of New South Wales and Tasmania, and the lower part of the Carboniferous Limestone formation of the whole world (there having as yet been no distinct identifications to prove the existence in Australia of the intermediate Middle Palæozoic or Devonian formations). Here we have the extinction of the characteristic Trilobites, Graptolites, Corals, and Mollusca marking the Cambrian and Silurian epochs in Europe and North America, as well as in Victoria, at the close of those periods occurring in the southern hemisphere synchronously with this great change in the northern half of the world; and the new generic creations

marking the Upper Palæozoic period succeeding them similarly at this fourth great step in the creative changes of the earth in Australia as at the antipodes. Thus amongst the palæontologically important class the Crustacea, the genera *Phacops, Odontochile, Portlockia, Calymene,* and *Beyrichia,* which abound in the Lower Palæozoic rocks of Victoria, as in Wales, are replaced by *Phillipsia, Brachymetopus,* and *Bairdia*—Crustacean genera characteristically distinguishing the Carboniferous rocks in England and Russia from the earlier Lower Palæozoic beds; again, amongst the Brachiopodous Mollusca, numerous species of the genus *Producta* characteristically separate at a glance the Carboniferous formations of Europe and America from the Lower Palæozoic rocks; and exactly the same geological date marks the appearance of the same genus in the rocks of Victoria. Then, again, in the vegetable kingdom, the Carboniferous Upper Palæozoic period is strikingly distinguished from the Lower Palæozoic deposits by the various sections of the great genus *Lepidodendron* and its related forms. I rejoice to be able to announce that, in Victoria, this period is similarly marked by a large distinct species of one of the sections of *Lepidodendron,* which I identified in a block of sandstone collected (without other fossils) by Mr. M'Millan, from the Avon ranges in Gipps Land. This fossil is of the same species as the only *Palæozoic coal-plant* ever collected in New South Wales, where it was found by the lamented Leichhardt near the borders of Queensland, on the Manilla river, fully *two hundred miles north of the localities affording the plants associated with the coal of the Hunter, and other parts of New South Wales* (*which I believe to be Mesozoic*), and by him given to the Rev. W. Clarke of Sydney, who sent it to me about twelve years ago for determination, during the controversy as to the age of the plant-beds of the Newcastle New South Wales beds, on which occasion I confidently pronounced, not only that it was a true Palæozoic coal-plant, but that it never came from the beds in dispute,—in which latter point I now find I was correct. To my friend Sir Charles Lyell, as well as to other geologists, I believe this identification of a true Palæozoic Carboniferous flora in Gipps Land will be of the highest interest, from the ingenious theory which they suggested to reconcile the difficulties arising from Prof. Morris and myself having indicated the strong connexion between the plant-beds associated with the coal of New South Wales and the Mesozoic coal-deposits of Europe, while we both agreed that the underlying marine beds were clearly Lower Carboniferous (Palæozoic), and the Rev. Mr. Clarke, the local authority, insisted that they were all of one age. The theory was this:—that possibly, owing to the immense geographical distance between Australia and the

typical sections of Europe, the plants growing on the land might have been those of the Oolitic period, while the sea contained the living inhabitants characteristic of the Palæozoic times. I combated this theory at the time by pointing to the similar Mesozoic coal-plants in Richmond, Virginia, at no great distance from the usual Palæozoic coal-flora of other American coal-fields, both remote from the typical European sections of the two coal-floras, but distinctly maintaining there their old-world peculiar forms. Nothing can, however, exceed the geological interest attaching to the distinct announcement I am now able to make of the land vegetation which first appeared, in the extreme remoteness of the Upper Palæozoic times, having been formed absolutely on the same type as that of the same period in the northern hemisphere; and here I am able to advance another step in the comparison between the ancient and modern natural history of Victoria and that of the antipodes, by showing that the wonderful identity in the marine fauna of the two hemispheres during the Palæozoic periods applied also to the productions of the dry land, which latter is also now shown to have emerged at the same period in Australia as the greater bulk of first dry land in Europe and America (the Devonian evidence being small exceptions to the otherwise first great appearance of dry land during the Carboniferous period)*.

3. *Mesozoic Period.*

The evidence of Mesozoic formations in Australia has been much disputed, resting until lately only on the characters of the fossil plants associated with the coal of New South Wales and Tasmania. This plant evidence is much more forcible now than ever, inasmuch as I have had opportunities of carefully investigating the fossil plants associated with coal seams in Victoria, at Cape Patterson and Bellerine, and for this colony I can now not only emphatically repeat the arguments which I used fourteen years ago, when writing on the plants associated with the coal of New South Wales† and Tasmania, namely, that all the genera and some of the species were closely allied to, or identical with, those of Mesozoic coal-beds, and that *all the characteristic Palæo-*

* It will be interesting to geologists to know that, up to a few months ago, Mr. Clarke had no stratigraphical evidence to bear out his view of the plant-beds being Palæozoic, or underlying the beds with marine Palæozoic fossils; *and no such sectional evidence has been found by Mr. Selwyn, the Government geologist, in his careful surveys of the coal-bearing sections* of Victoria and Tasmania; and the only section (Stony Creek, Maitland) now relied on by Mr. Clarke is, I think, clearly a deceptive appearance produced by a fault drawn on a section in which the vertical scale was enormously out of proportion to the horizontal one.

† Annals of Nat. Hist. ser. 1. vol. xx. pp. 145, 226, 298.

zoic coal genera, as Calamites, Lepidodendron, Sigillaria, Stigmaria, &c., were completely absent, but I can add the very important fact that the *Pecopteris australis* (certainly identical with an Indian species from the Rajhmahal beds), with the *Phyllotheca* and other well-known plants of the beds associated with the coal in New South Wales and Tasmania and Victoria, are associated with numerous species of genera and even families of plants highly characteristic of the Mesozoic and more recent (as distinguished from the older) eras. Thus I have characterized four very distinct species of *Zamites* in the Bellerine beds, one only being rare (the *Z. ellipticus*, M'Coy, so called from its broad ovate leaflets), the three others being abundant: of these the most strongly marked is the *Zamites Barklyi*, which I have dedicated to His Excellency the Governor, in commemoration of the lively interest he has taken in the geology of the colony; and another the *Zamites longifolius* (M'Coy), I have also seen from the New South Wales beds. No *Cycadeous* plants are known anywhere in true Palæozoic coal-beds. I have also characterized a species of *Tæniopteris* almost identical with the *T. vittata* of the Yorkshire (Scarborough) Oolitic coal-beds, and which I have described in a paper before the Royal Society of Victoria under the name *Tæniopteris Daintreei*, after the gentleman who first collected it from the rocks associated with the coal of Cape Patterson; and it also occurs commonly in the two other Mesozoic coal localities near Melbourne, the Barrabool Hills and Bellerine. As the Baron de Zigno, in his recent writings on the Jurassic fossil flora, adopts my view instead of the Rev. Mr. Clarke's, as to the Mesozoic age of these Australian plant beds, because, as he says, the early statements of that gentleman, that the various characteristic Palæozoic genera *Lepidodendron, Sigillaria,* &c., occurred abundantly in them, had not been verified*, it will be of high interest to European geologists to learn that up to the moment at which I write no trace of them has ever been found in *the beds* containing the *Glossopteris, Phyllotheca, Pecopteris australis,* the *Tæniopteris,* or the *Zamites,* and that the only *Lepidodendron* or characteristic Palæozoic Carboniferous genus found *was hundreds of miles from the beds containing the* (*as I believe*) *mesozoic plants, and not mixed with them.* One argument used by the Rev. Mr. Clarke against the Mesozoic age of these plant-beds was the supposed absence of marine Mesozoic fossils in Australia; but even this argument (of no value, as I pointed out by a reference to Richmond, Virginia) has failed

* Not only have they not been verified, but I can confidently state now that any of the supposed recognitions of such genera only rested on misconceptions of portions of the ordinary mesozoic forms previously made known.

within the last few weeks: for a friend of Mr. Clarke's having collected a number of fossils from Wollumbilla, in the northern part of New South Wales, the latter gentleman sent them to Melbourne with a request that I "would determine the geological epoch to which they belonged;" and here, without at all entering on the description of the species, I can state that they furnish a most complete answer to the objection, and are the marine equivalents of exactly the same age as that I assign to the plant beds, *i. e.*, Lower Mesozoic, not older than the base of the Trias, and not younger, I think, than the lower part of the great Oolite. The collection contains large *Belemnites* of the general aspect of *B. giganteus, B. paxillosus* and similar Lias and Lower Oolite forms, *Pentacrinus*, and a number of large species of *Serpula, Lima, Pecten, Arca, Nucula, Rhynchonella*, &c., having the general facies of Lower Oolitic, Liassic, and Triassic forms*. And thus we reach the next great onward step in our attempt at a comparison of the natural history of Australia and other countries in the ancient periods, the history of whose creations can only be traced by palæontology; and we find that at this the Oolitic epoch to which allusion was made at the commencement of this paper, the whole facies of the fauna of the sea and the flora of the land had undergone just such changes as marked the geologically corresponding creations in India, Yorkshire, Germany, and America. I may remark that in the Wollumbilla fossils there are no *Trigoniæ*, although from the remarks in the first paragraph it is obvious that English geologists would expect them; but in their place I recognized a distinct species of Professor Bronn's muschelkalk genus *Myaphoria*, enabling me to suggest, on palæontological grounds, the presence of triassic beds in Australia.

4. *Tertiary Period.*

The next epoch in the Ancient Natural History of Australia, represented by the deposition of the widely spread Tertiary formations, could not have been contemplated by those who indulged in the speculations referred to in the beginning of this paper; for we find that here, as in Europe, the greater part of the country sank under the sea during the Tertiary period, and every trace of the previous creations of plants and animals was destroyed and replaced by a totally different new set, both of plants and animals, more nearly related to those now occupying the land and sea of the country. This, then, quite puts an end to the

* In a note received from Mr. Clarke since learning my impression of the age of these fossils, I am happy to state he announces his willingness now, as a new view, to consider his "Wianamatta beds," connected with the disputed Coal beds, as Lower Mesozoic.

speculations based on the supposition that Australia, unlike the rest of the world, had remained as dry land since the Oolitic period, and that the living little *Myrmecobius* and *Perameles* or *Bandicoots* were the associates of those little marsupials which lived at the time of the deposition of the Stonesfield or Collyweston slate of the Oolitic period in England. The fact really is, that in Victoria there is a rich Tertiary Dicotyledonous flora, totally unlike the Mesozoic one; and in Victoria, as in New Zealand, India, North and South America, and Europe, the races of animals now inhabiting the land were preceded in the most recent Tertiary or Pleistocene time by gigantic antitypes, as it were, characterized by the same anatomical peculiarities which mark the recent inhabitants of the place. Thus, as New Zealand had her little Kiwis or *Apteryx* preceded by an equally wingless but gigantic bird, the Moa or *Dinornis*, and South America had her existing peculiar little Sloths preceded by the colossal *Megatherium* and *Mylodon*, presenting the same peculiarities of anatomical conformation, so the Wombat and Kangaroo, the most peculiarly characteristic genera now inhabiting Australia, were preceded by the gigantic *Diprotodon* and *Nototherium*, in some measure uniting the osteological peculiarities of those genera; and their bones are found, like those of the extinct gigantic Irish Elk (*Megaceros*) of the same period, apparently bogged or mired in the mud of the ancient *Pleistocene* lakes. With these, at Lake Timboon and other localities in Victoria, true Kangaroos (*Macropus*) are found (*M. Titan*) of a size greatly exceeding the living ones. With these in some of the caverns, as at Mount Macedon, are found remains of recent species of *Hypsiprymnus*, *Hydromys*, and the carnivorous *Dasyuri* and the *Canis Dingo* or native dog, the recognition of which latter, I think, settles the point of its being truly an indigenous animal. I have likewise recognized the bones of the Wombat (*Phascolomys*) in the solid, hard, stony, ferruginous auriferous drift called "cement" by the gold-diggers, at a great depth in the sinkings at Dunolly, the material being so hard that the jaws could only be cleared by a stone-mason's chisel; this determination enables me to say that the age of the gold-drift of Victoria, like that of Russia, is, as Sir R. Murchison showed for the latter country, that of the "mammaliferous crag" of England.

The marine Tertiary fauna of Victoria is highly interesting in a natural-history point of view, from the extraordinary evidence it affords of the "law of representation, or representative forms," which it presents. Thus a series of beds about ten or twelve miles from Geelong, which I believe to be Lower Miocene, and a series of beds on the opposite shore of Hobson's Bay, between Mt. Eliza and Mt. Martha, which I believe to be Upper Eocene,

present the most extraordinary series of species of *Voluta*, representative of those of the Eocene clay of Barton cliff in Hampshire, and of the Miocene beds of the basins of Paris and Vienna, that can be conceived: the *V. spinosa*, *V. modesta*, and *V. suturalis* of the European Miocene beds are so exactly represented by species in the Geelong beds, that it requires a close examination to perceive the difference; and similarly the English and French series of Eocene species, *V. luctatrix*, *V. spinosa*, *V. lyra*, *V. ambigua*, and *V. digitalina* are "*represented*" in the most curious and exact manner by a similar series of species in the Victoria beds, having the same relations of form between themselves, and specifically almost undistinguishable at first sight from their northern analogues—the likeness being rendered stronger by the recognition of this complete parallel series in each hemisphere: and yet there is a minute difference (considered generic by some writers) separating the two series from each other,—the Eocene Tertiary Volutes of Europe having a regular sharp-pointed spire and forming the genus *Volutilites* of Swainson, while the Australian "*analogues*" have the distorted mammillated tip to the spire characteristic of the recent *Volutidæ*. Then, again, the common *Cassidaria depressa* of the Lower Miocene of Germany is so exactly represented by an equally common species in our beds of the same age, which I have named *Cassidaria reticulospira*, that the two can be distinguished only by the character indicated of a reticulation of the extreme whorls of the spire. The *Trivia avellana* of the same European beds is exactly replaced by the almost identical *Trivia avellanoïdes* (M'Coy) in the Victoria beds, and so on through a long series of representative forms, giving us the first distinct proof, in our progressive sketch of the development of life in Victoria, of the action of the "law of representation of specific centres" which plays so important a part in the distribution of organic life on our globe at the present day, but which, as we have seen, apparently had no effect in the more ancient times.

As bearing upon that question of great interest to the European geologist, the palæontological evidence of progressive changes of temperature in our earth, geologists will be interested to know that, as the living species in the European Miocene Tertiaries are generally inhabitants not of the neighbouring seas but of more southern warmer latitudes, so I observe exactly the same fact in Victoria, the recent shells mingled with the extinct ones in our Miocene deposits being usually forms not living in our bay or in the adjacent seas, but inhabitants of New Zealand (as the *Pectunculus laticostatus*, which is common in the fossil state with us, though not now living nearer than New Zealand) and the warmer latitudes of Adelaide and Northern Australia,—thus

showing here, as in Europe, the gradual cooling of our globe during the Eocene and Miocene periods. To refer again to the mistaken popular theory alluded to in the first paragraph, in which the suggestion is dwelt on of the present existence in the Australian seas of the possibly oolitic *Trigoniæ*, I think it of great interest to state that the four living species of *Trigonia* seem to have been created only during the modern period, and are represented in our Tertiary deposits by a totally distinct species—the *Trigonia semiundulata* (M'Coy).

5. *Recent Period.*

As the space assigned to me has been far exceeded, I can only offer a few remarks on the Existing or Recent Natural History of the country, which is so much better known than that which has preceded. The recent Mammalia and Birds of Australia are so fully known from the admirable works of my friend Mr. Gould, that I shall not allude at all to them, further than to correct an error which seems to be universal in books, and occurs even in the memoirs of Mr. Ronald Gunn, of Tasmania, namely, that the large *Dasyurus maculatus* is only found in Tasmania, and not on the Australian mainland. I have had seven or eight specimens collected for the National Museum from the Yarra Mountains and other hilly localities within thirty or forty miles from Melbourne. Contrary to my preconceived opinion, I have satisfied myself that the native Dog (*Canis Dingo*) is truly an indigenous animal, both from its increasing in numbers (with little variety) towards the interior of the continent remote from man, and from having identified its bones mingled with those of recent and extinct animals all in one state of preservation in the bone-caverns recently opened beneath the basalt flows at Mount Macedon.

Of Reptilia the great *Hydrosaurus varius*, called Iguana by the colonists, and often 5 feet in length, is the most important of the Lacertilia; several smaller types are also common near the coast, as the *Hinnulia tæniolata*, *Cyclodus gigas*, and *Grammatophora muricata*; and the *G. barbata* and *Trachydosaurus rugosus* (called Dew-*lizard* by the colonists) become gradually common as you approach the warmer country near the northern boundary of the colony, but do not occur, I believe, south of the dividing range. Of Batrachia the *Ranhyla aurea* is the exceedingly common Green Frog of the country, and is so unlike *Hyla* in its habits, which agree completely with *Rana*, that its generic separation from *Hyla* (contrary to the opinion of several able authorities) is I think quite necessary. In two other Frogs, species of *Lymnodynastes*, the unexpected habit is found, in this arid, water-

less country, of habitually living buried to a considerable depth in the sandy ground during the day, coming up to feed by night, when in their turn they furnish food to the snakes on the dry plains. The Chelonian reptiles are not found nearer than the River Murray, where the only species known, *Chelodina longicollis* and *C. oblonga*, are those described by my friend Dr. J. E. Gray, of the British Museum, to whom our National Museum is so greatly indebted for the most valuable and friendly aid. The Snakes of the colony are rather numerous, and all, with one exception, poisonous; and that exception—the Carpet-Snake (*Morelia variegata*)—is only found in the warmer northern part of the colony. On the other hand, the venomous Snakes, properly so called, with isolated fangs, are scarcely found, the only example of Australian *Viperidæ* being the Death or Deaf Adder of colonists, the *Acanthophis antarctica* being extremely rare in Victoria, and only found in the warm districts near the northern boundary. The rest of the Snakes belong to the *Colubridæ*; and as the Snakes of Victoria have not yet been enumerated, I may just mention those I have ascertained. The *Hoplocephalus superbus* is a very abundant snake near Melbourne, and this poisonous snake is often unfortunately referred to erroneously under the name of "Diamond Snake" in accounts of experiments on the bites of poisonous Snakes and antidotes,—the true, harmless Diamond Snake (*Morelia spilotes*) of New South Wales not having as yet been observed in the colony of Victoria. The *Hoplocephalus curtus* is a still more abundant and venomous species around Melbourne, where it is usually called "Tiger Snake" from the brown transverse banding of most specimens; it differs remarkably from all the others of the genus in its power of dilating the sides of the neck, when irritated, into a broad, flat, leaf-like hood as in the Cobra. These two species become more rare towards the north, not having been observed in the warmer regions. *Hoplocephalus Gouldi* is extremely rare, I having only seen one Victorian specimen, it being here replaced by the only new species I have met with, namely, the *Hoplocephalus flagellum* (M'Coy), the common little "Whip Snake" of the colonists, having 19 and 17 rows of scales as constantly as its representative in W. Australia has 15. The beautiful little *H. coronoides* of Tasmania also occurs in Victoria, but is rare. Of *Diemansia* we have only one species, the *D. reticulata*, one of the commonest of the small snakes towards the Murray boundary of the colony, but not found in the cooler localities towards the southern coast. The beautiful "Black Snake" of the colonists (*Pseudechys porphyraicus*) is a formidable and very poisonous species, but has become very rare of late years in Victoria. The most dangerous of all the snakes of the colony, both from its size (usually about

five feet), its abundant distribution everywhere through the colony, and the fatal venom of its bite (frequently killing dogs and occasionally men), is the "Brown Snake" of the colonists—the *Pseudonaja nuchalis*, closely related to the *Naja* or Cobra of India. The statement published in Melbourne some years ago of the occurrence of a species of true *Boa* in Victoria only rested on a mistaken determination of the common Carpet-Snake (*Morelia variegata*), in which the obvious characters which distinguish the Pythons of India, Africa, and Australia from the true Boas, confined to America, were overlooked.

In the class of Fishes many species remain yet to be determined. The more important species used as food are the "Schnapper" of colonists (*Pagrus unicolor*), abundant and often of great size, with large numbers of which the market is regularly supplied, and which is caught and dried in great quantities by the Chinese fishermen in Hobson's Bay, and supplied to their countrymen on the various gold-fields. The next most important species, from its being almost equally abundant at times in the market, and of equally large size and superior flavour, is the great Cod-perch, the "Murray-cod" of the colonists—the *Grystes Peeli* of Mitchell, or *Oligorus Macquariensis* of modern writers. A very much larger (occasionally five feet in length) and finer fish for the table, only an occasional visitor however, is the "King Fish" of colonists, which seems to me completely identical with the great "Maigre" of the Mediterranean—*Sciæna aquila*. Dr. Günther, the most recent European writer on ichthyology, in his General Catalogue of Acanthopterygian Fishes, states that the family *Sciænidæ*, to which this fish belongs, has never been found in Australia. The fishes commonly called "Mullet" (*Dajanus Diemensis*) and "Whiting" (*Sillago punctata*) by the colonists are common in the fish-shops for the table, together with three species of "Flathead," *Platycephalus nematophthalmus, P. tasmanius,* and *P. lævigatus*, which are caught abundantly in the bay at all times. Another tolerably good table-fish is known to the colonists, and is found in the market under the name of "Pike," though, like all the other fishes bearing the names of English species, it has little resemblance and no affinity to the fish of that name in Europe: it is the *Sphyræna obtusata* and *S. Novæ Hollandiæ*. The so-called "Herring" of the fishermen is the *Centropristis Georgianus*, with which the market is also abundantly supplied. The "Baracoota," which visits us regularly, and is in some request for the table, is certainly the Cape of Good Hope *Thyrsites atun*. The small Ling, the *Lota breviuscula*, is occasionally procured for food on the coast, but is chiefly remarkable for the old full-grown fish (about a foot long) having, two or three years ago, been stated by some fishermen

to be the young of the great Newfoundland Cod: it was in vain that I pointed out the generic difference in the number of the fins, &c., and that these supposed young were adult; the "practical men" carried conviction so far with them, that the merchants of the town subscribed some hundreds of pounds, twice, to fit out a vessel to commence a great cod-fishing, on a supposed cod-bank a few miles out, as a mercantile speculation. The Dory (*Zeus Faber*) is a rare visitant, but whether as delicious here as in Europe I cannot say, although a party of my scientific friends actually ate one of the three specimens I have known to occur during the seven years I have been in the colony, instead of sending it to the Museum. A Guard-fish (*Hemirhamphus*), a Tunny (*Thynnus*), and an Eel (*Muræna*) are also commonly used for food. Amongst useful fishes not good for food, I may mention the common European Sunfish (*Orthagoriscus Mola*) as not uncommonly caught in the Bay, for its large supply of oil.

Of Crustacea few kinds are used for food in Victoria: there are no true Lobsters and no Crabs (*Cancridæ*) fit for the table; but a spiny Crayfish of about the same size and shape as the English species is very common at the Heads, and is supplied abundantly to the market: it is nearly identical with the *H. annulicornis*. The gigantic Murray River Crayfish (the *Astacoides serratus*) is now sent down alive in great numbers to the market for the table. The smaller River Crayfish (the *Astacoides quinquecarinatus*) is also often eaten in the country, but is not sent to market; it forms the chief food of the so-called "Murray Cod," from the stomach of one of which I took twenty nearly perfect.

Melbourne University, 30th September, 1861.

XVIII.—*On some new Species of* Cylichnidæ, Bullidæ, *and* Philinidæ, *from the Seas of China and Japan.* By Arthur Adams, F.L.S. &c.

Genus Cylichna, Lovén.

1. *Cylichna japonica,* A. Adams.

C. testa cylindracea, rimato-umbilicata, epidermide fusca tenui sæpe obtecta, utrinque rotundata, apice perforato, transversim tota subtilissime striata, striis antice distantioribus; apertura lineari, antice dilatata; labio tenui, elongato, simplici; labro margine vix recto, postice valde producto et rotundate angulato.

Hab. Korea Strait; 46 fathoms.

Next to *C. arachis,* Quoy, which was likewise obtained in the